ABSTRACTS OF THE ARTICLES

ROAD DAMAGE IN EAST IZU REGION AT THE 1978 IZU-OSHIMA KINKAI EARTHQUAKE

Takahiro Kunii* and Takahisa Enomoto**

Comprehensive Urban Studies, No. 5, 1978, pp. 3—7

Mountain roads and slopes have received considerable damage from recent earthquakes. Road damage in this earthquake occurred at many points in the East Izu region and much of this damage resulted from damage to mountain slopes. This report directs attention to this slope damage. The relation between damage and slope type, and the intensity of damage at any one point in relation to the distance from the epicenter are the main topics of concern.

* Center for Urban Studies, Tokyo Metropolitan University
** Research Assistant, Kanagagawa University

EARTHQUAKE FAULTS, ACCELERATION AND DAMAGES RELATED TO THE 1978 IZU-OSHIMA KINKAI EARTHQAKE

Toshio Mochizuki*, Toshikazu Tamura*
Iware Matsuda* and Michio Miyano**

Comprehensive Urban Stndies, No. 5, 1978, pp. 9—37

The earthquake which hit the southeastern part of the Izu Peninsula and Oshima Island on January 14, 1978 was named "the Izu-oshima Kinkai Earthquake" after location of its epicenter.

The authors have carried out comprehensive joint researches in the damaged areas of the Izu Peninsula, especially in and around Inatori, Higashiizu-cho. Their research opportunities have been earthquake faults, distribution of acceleration deduced from fallen tombstones, damages to structures including wooden houses and reinforced concrete buildings, land slides, etc.

The eastward extension of the fault which generated the earthquake has been estimated from Inatori to Nashimoto on the basis of the characteristics of the several earthquake faults detected in the research region, the distribution of the epicenters of the

observed aftershocks etc. The distribution of acceleration and damages including to many kinds of structures and land slides are more closely related to the earthquake faults than geological conditions or intensity of earthquake tremors.

* Center for Urban Studies, Tokyo Metropolitan University
** Graduate School of Engineering, Tokyo Metrapolitan University

ROAD DAMAGE AND SOCIAL IMPACT BROUGHT ABOUT BY THE IZU-OSHIMA KINKAI EARTHQUAKE IN IZU AREA

Hitoshi Yamakawa*, Tetsuo Akiyama*
Kôichi Terajima,** and Ichiji Satô***

Comprehensive Urban Stndies, No. 5, 1978, pp. 39—70

Kamogun, Shimoda City and part of Tagatagun, Ito City and Atami City received damage in the Izu-Oshima Kinkai Earthquake which occurred on January 14, 1978, Damaged the most were Higashiizu-machi and Kawazu-cho. Landslides resulted and heavy damage was done to private and commercial structures as public facilities, but roads in particular were severely damaged. This report describes the social impact of the earthquake as follows.

1) Kamo-gun and Shimoda City can be regarded as tourist resort town.
2) Damage occurred in each area and their institutions are then considered.
3) Emergency and restoration action necessary to cope with such damage is discussed.
4) Finally, in order to determine damage and inconvenience suffered by the residents, an investigation was conducted in Kawazu-cho which was hit the hardest.

* Centerfor Urban Studies, Tokyo Metropolitan University
** Graduate School of Engineering, Tokyo Metropolitan University
*** Under graduate School of Engineering, Tokyo Metropolitan University

A CASE STUDY OF THE ESTIMATION OF DAMAGE DONE TO A COMMUNITY BY DISASTER

Itsuki Nakabayashi*

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The author analyzes losses brought about by disaster in damaged districts for the purpose of studying the way of estimations of the damage intensity. This paper deals with the recent five disasters; Izu-Ohshima Kinkai Earthquake (1978, M. 7. 0), Miyagi-ken Oki Earthquake (1978 M. 7. 4), Sakata Conflagration (1976), Mishaki Confagration (1975) and 17th Typhoon in Kochi(1975). And ten self-governing bodies, as the badly damaged districts from them, are dealt with.

Results of the study indicated the following.

The measurement of damage intensity must take into consideration of the ratio of victims, capitation loss and the ratio of total loss to the tax yields of each self-governing body rather than an overall net loss. Even in the cases of the most badly damaged districts from earthquake, typhoon and so on, the ratio of victims is never more than 50-60 % of the total population and the ratio of those suffering most of that rarely exceeds 15 %. In the most badly damaged districts from earthquake and conflagration, the ratio of total loss to each tax yield often exceeds 800%, while the ratio of that rarely exceeds 100% in the most badly damaged district from typhoon.

Frequently the indirect damage occured from disaster is equal to if not more than direct damage. But in many cases, indirect damage cannot be measured precisely. There fore, the intensity of indirect damage is not recognized.

* Center For Urban Studies, Tokyo Metropolitan University.

THE MAXIMUM ACCELERATION ESTIMATED BY TOMBSTONES IN THE JUNE 1978 MIYAGIKEN-OKI EARTHQUAKE

Takahiro Kunii* and Takahisa Enomoto**

Comprehensive Urban Stndies, No. 5, 1978, pp. 103—114

Tombstones in temples give much information on the maximum acceleration at the ground surface. In this investigation, the distribution of maximum acceleration was taken from about 150 temples in Miyagi Prefecture. This recent report gives the results.

* Center for Urban Studies, Tokyo Metropolitan University
** Research Assistant, Kanagawa University

TYPES OF EARTHQUAKE DAMAGE DONE TO HOUSING SITES IN ARTIFICIALLY MODIFIED HILL-LANDS

Toshikazu Tamura*, Takashi Abe** and Toyohiko Miyagi***

Comprehensive Urban Stndies, No. 5, 1978, pp. 115—131

Housing sites constructed upon the artificially reformed hill-lands have undergone the first serious damage by an earthquake on June 12th, 1978, in the Sendai area in North-eastern Japan. The hill-zone around Sendai City is one of the most intensely modified lands with residential development in Japan. The earthquake, with a magnitude of 7.4 and its epicenter located about 120km east of Sendai, brought an intense shock with a maximum horizontal ground velocity of 250gals or more in the residential districts in the hills around Sendai.

Various types of damage, including landslides and land subsidence in filled zones and formation of cracks in the ground near the boundaries between filled and cut zones, were described and the causes of them were discussed in relation to the modes of artificial landform alteration. The results can be applied to the estimation of earthquake disasters in similarly prepared residential districts in the hills around many other cities. It was tentatively practiced in the Tama Hills, west of Tokyo.

These investigatigations should be utilized not only for the technical improvement for disaster prevention but also for the reexamination of urban and suburban land-use in the hills of Japan.

* Center for Urban Studies, Tokyo Metropolitan University
** Miyagi-gakuin Women's University
*** Graduate School of Science, Tohoku University

A CASE STUDY OF PRESUMABLE WATER INTRUSIONS INTO SUBWAY TUNNELS AFTER A STRONG EARTHQUAKE IN TOKYO'S KOTO DISTRICT

Kunio Arai* and Nobuo Marui*

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The danger of subway tunnels to be submerged following a heavy earthqake is be-

ing considered. The investigated subways are the Metropolitan No. 1, No. 10 Lines and the Tozai Line which run beneath the area known as the Koto District. In these subways various contermeasures against high tides and/or floods such as the installations of water tight doors at station entrances, water-tight gates in the tunnels and artificial ventilation systems have taken shape, since the area is located on low land that varies from +2 to −3 meter above mean sea level.

In respect to the ground surface around each entrance of all stations and each tunnel the relationships between level and space volume below the level were shown graphically. From these graphs it is easy to compute the total water volume needed to flood the ground area bounded by embankments or each platform of stations in question. And the graphs may be useful for emergency measures after the occurrence of water intrusion to the area or into the tunnels.

The danger of flooding for each station is investigated using the water volume described above. The ground surfaces around the stations of Oshiage, Minamisunamachi, Toyocho, Nishioshima and Oshima and the station platforms of Asakusa, Kiba, Hamacho, Kikukawa and Nishioshima may be more perilous than the others. The stations of Honjoazumabashi, Monzennakacho and Sumiyoshi may basicall serve as a place of refuge for passengers after the occurrence of a heavy earthquake.

* Center for Urban Studies, Tokyo Metropolitan University

A SIMULATION ANALYSIS OF THE REFUGE BEHAVIOUR IN URBAN AREAS AFTER A STRONG EARTHQUAKE

Takao Horiguchi* and Shunkichi Kosaka*

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This paper introduces a simulation analysis of the refuge behaviour of people living in urban areas if a heavy earthquake should occur and fire breaks out. In this technique, presumed human behaviour and urban frames are taken in consideration, and also fundamental factors such as

1) the occurrence distribution of refugee
2) the choice of refuge direction
3) the physical restrictions in the course of refuge

are investigated.

Further applications of this technique, on the heavily populated areas of large cities and in the central area of Fukui City where a strong earthquake occurred in 1948, explain that these simulation analyses are useful in working out a strategy of refuge operation due to their numerical estimations.

* Center for Urban Studies, Tokyo Metropolitan University